CLAIMS:

1.   A parallel magnetic resonance imaging method comprising the following
method steps:

a)   exciting core magnetization in the examination volume of an MR device by
generating at least one HF pulse;

b)   parallel recording of two or more MR signals from the examination volume
via two or more receiving channels (R, S) of the MR device using an HF coil arrangement (9)
comprising a number of coil elements (15, 16), which is larger than the number of receiving
channels (R, S), the respective MR signal on each receiving channel (R, S) being formed by
weighted superimposition of coil signals (A, B, C, D, E) of the individual coil elements (15,
16);

c)   reconstruction of an MR image from the recorded MR signals, the MR signals
being combined with one another taking into account the effective spatial sensitivity profiles
associated with the individual receiving channels (R, S).

2.   A method as claimed in claim 1, wherein the weighting factors for the
weighted superimposition of the coil signals (A, B, C, D, E) on the individual receiving
channels (R, S) is calculated such that the image noise in predeterminable image points or
image areas of the reconstructed MR image is minimal.

3.   A method as claimed in claim 2, wherein the weighting factors are calculated
according to the spatial sensitivity profiles of the individual coil elements (15, 16) and their
noise behavior.

4.   A method as claimed in claim 2 or 3, wherein the effective spatial sensitivity
profile associated with each receiving channel (R, S) is calculated from the spatial sensitivity
profiles of the individual coil elements (15, 16) of the HF coil arrangement (9) according to
the weighting factors for the weighted superimposition of the coil signals (A, B, C, D, E) on
the respective receiving channel (R, S).

5.   A magnetic resonance device comprising a main field coil (1) for generating a homogeneous, static magnetic field in an examination volume, an HF coil arrangement (9) consisting of a plurality of coil elements (15, 16), the coil elements (15, 16) being connected to two or more receiving channels (R, S) via a weighting mechanism (10), in such a way that an MR signal is generated on each receiving channel (R, S) by weighted superimposition of coil signals (A, B, C, D, E) received from the examination volume by means of the individual coil elements (15, 16) according to predeterminable weighting factors, and comprising a control mechanism (6) for controlling the weighting mechanism (10) as well as a reconstruction and a visualization mechanism (13) for processing and displaying the MR signals, wherein the control mechanism (6) and/or the reconstruction and visualization mechanism (13) have a program control, by means of which a method according to any one of claims 1 to 4 can be carried out on the MR device.

6.   A magnetic resonance device as claimed in claim 5, the number of coil elements (15, 16) of the HF coil arrangement (9) being greater than the number of receiving channels (R, S).

7.   A magnetic resonance device as claimed in claim 5 or 6, the weighting device (19) comprising signal processors.

8.   A computer program for an MR device as claimed in any one of claims 5 to 7, wherein a method according to any one of claims 1 to 4 is implemented by the computer program on the control mechanism and/or the reconstruction and visualization mechanism of the MR device.

9.   A computer program for optimizing the use of an HF coil arrangement consisting of a plurality of coil elements for parallel MR imaging, wherein the computer program calculates weighting factors for the formation of two or more MR signals by weighted superimposition of coil signals of the individual coil elements in such a way that the image noise in predeterminable image points or image areas of an MR image reconstructed from the MR signals is minimal.

10.   A computer program as claimed in claim 9, wherein the weighting factors are calculated according to the spatial sensitivity profiles of the individual coil elements and their noise behavior.